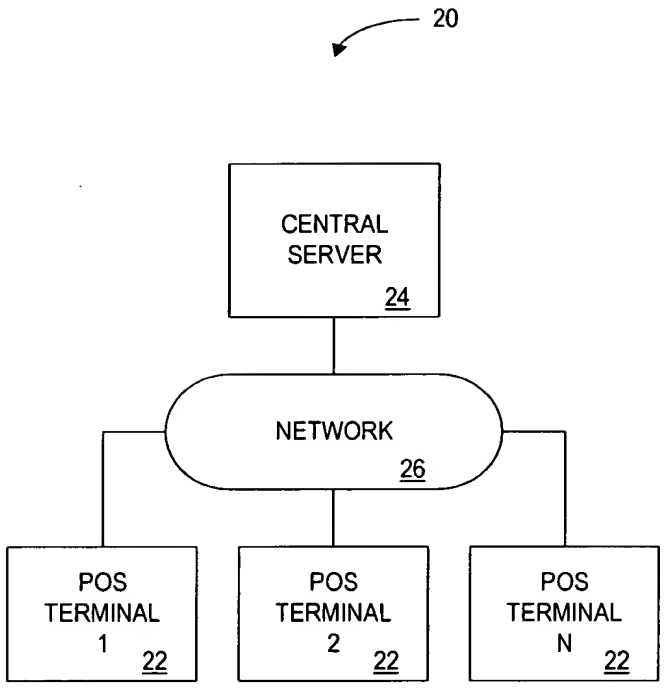
20
CENTRAL SERVER
24
NETWORK
26
POS TERMINAL 1
22
POS TERMINAL 2
22
POS TERMINAL N
22

FIG. 1

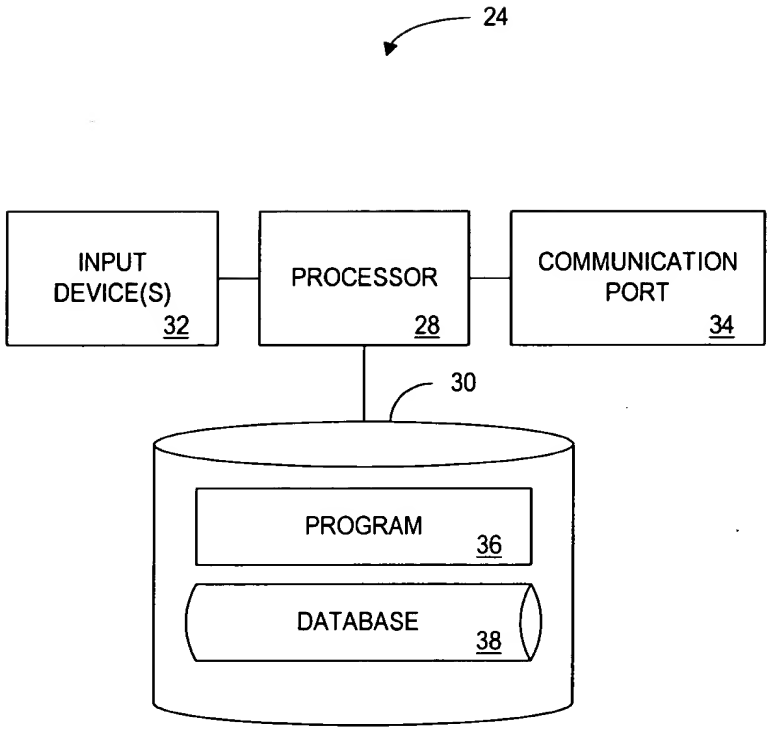
24
INPUT DEVICE(S) 32
PROCESSOR 28
COMMUNICATION PORT 34
30
PROGRAM 36
DATABASE 38

FIG. 2

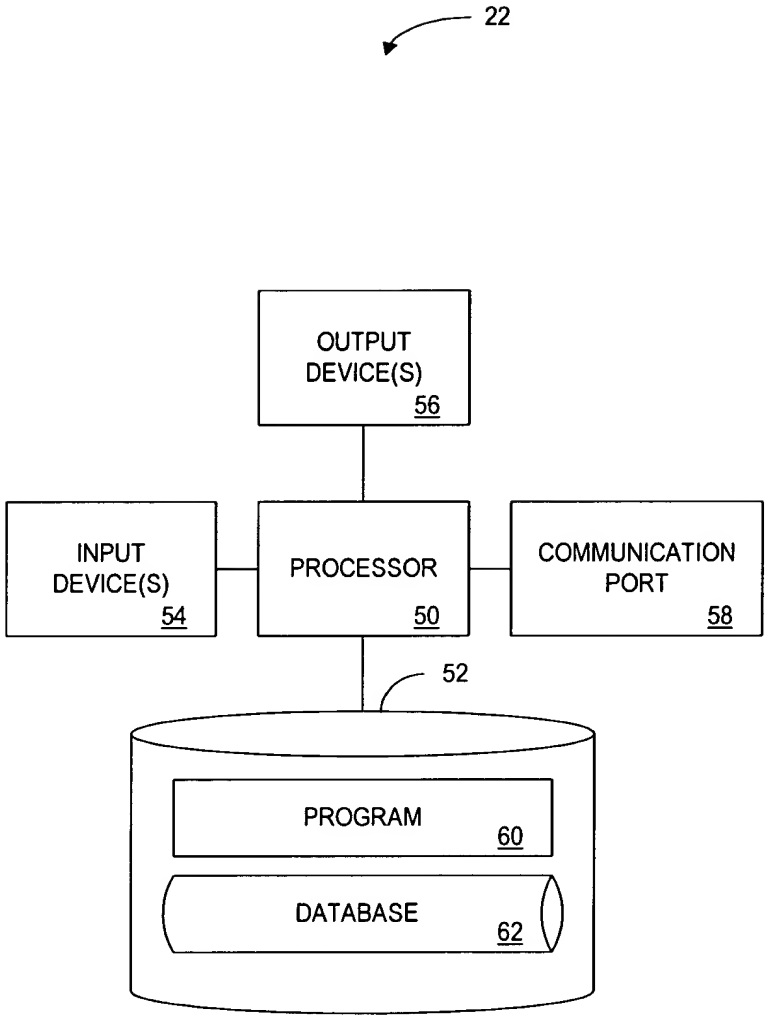
22
OUTPUT DEVICE(S) 56
INPUT DEVICE(S) 54
PROCESSOR 50
COMMUNICATION PORT 58
52
PROGRAM 60
DATABASE 62

FIG. 3

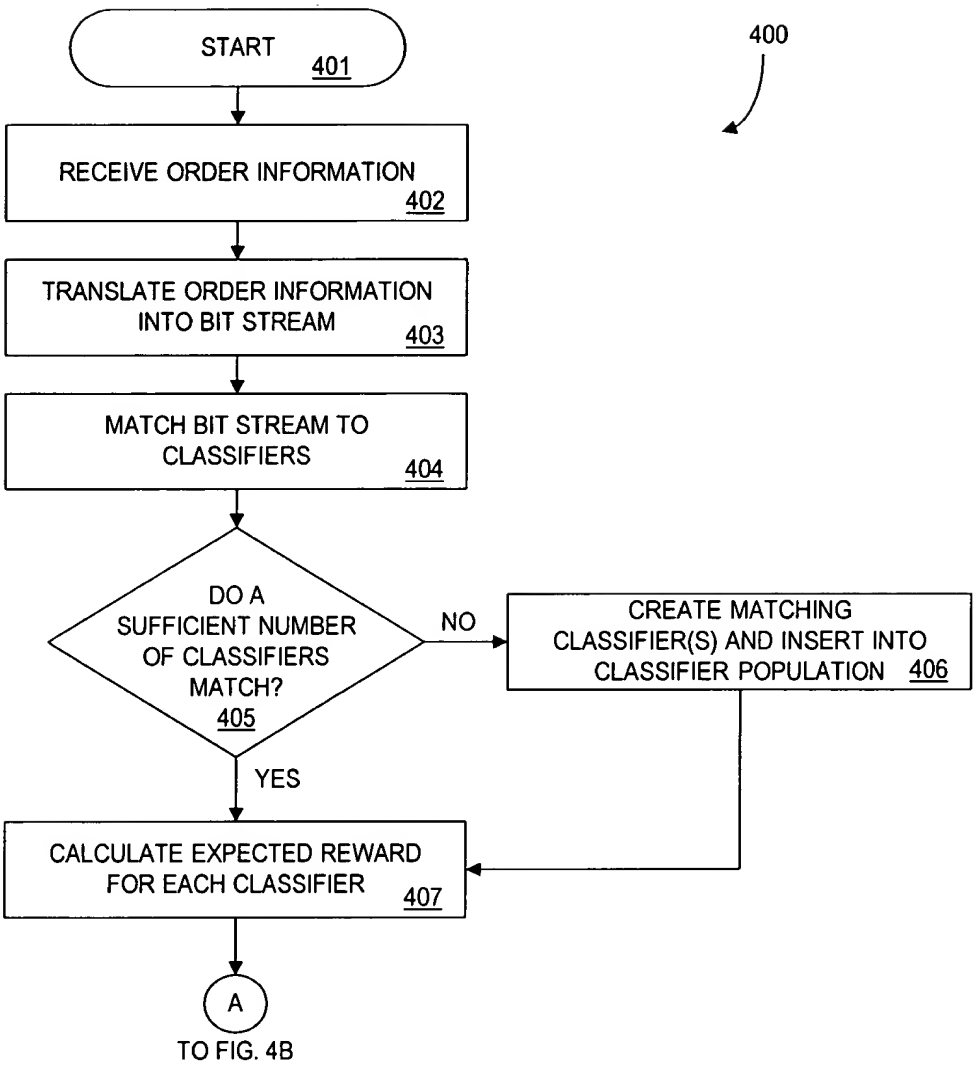
400
START
401
RECEIVE ORDER INFORMATION
402
TRANSLATE ORDER INFORMATION INTO BIT STREAM
403
MATCH BIT STREAM TO CLASSIFIERS
404
DO A SUFFICIENT NUMBER OF CLASSIFIERS MATCH?
405
NO
CREATE MATCHING CLASSIFIER(S) AND INSERT INTO CLASSIFIER POPULATION
406
YES
CALCULATE EXPECTED REWARD FOR EACH CLASSIFIER
407
A
TO FIG. 4B

FIG. 4A

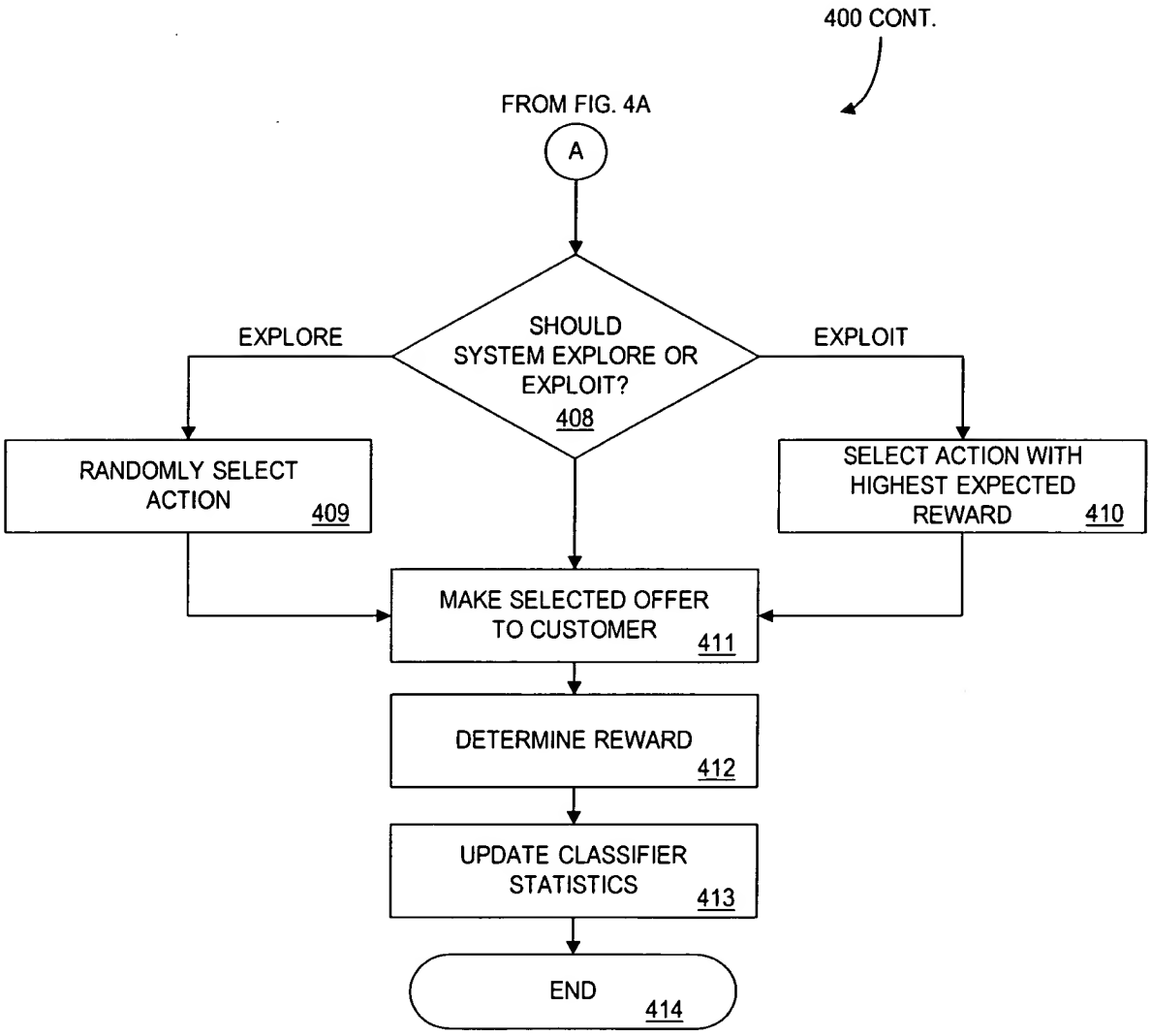
400 CONT.
FROM FIG. 4A
A
SHOULD SYSTEM EXPLORE OR EXPLOIT? 408
EXPLORE
EXPLOIT
RANDOMLY SELECT ACTION 409
SELECT ACTION WITH HIGHEST EXPECTED REWARD 410
MAKE SELECTED OFFER TO CUSTOMER 411
DETERMINE REWARD 412
UPDATE CLASSIFIER STATISTICS 413
END 414

FIG. 4B

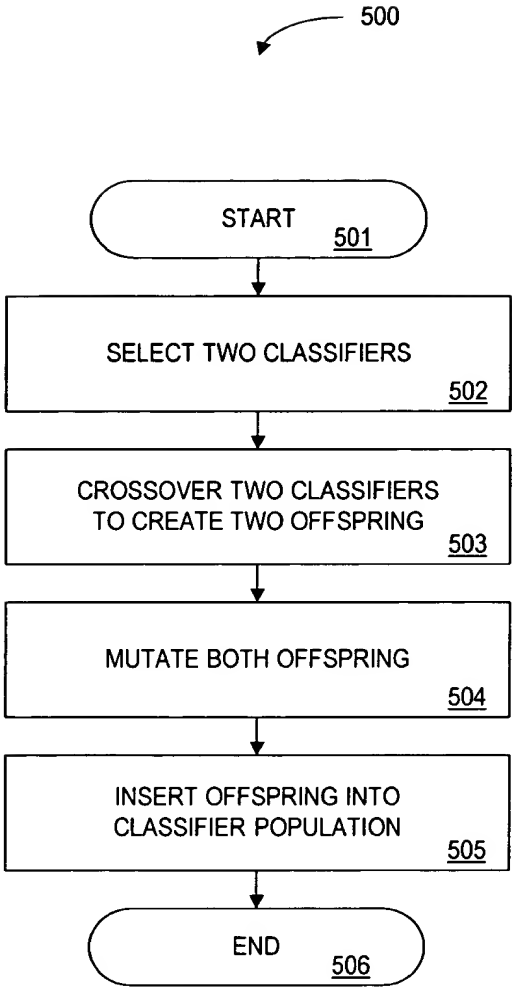
500
START
501
SELECT TWO CLASSIFIERS
502
CROSSOVER TWO CLASSIFIERS
TO CREATE TWO OFFSPRING
503
MUTATE BOTH OFFSPRING
504
INSERT OFFSPRING INTO
CLASSIFIER POPULATION
505
END
506

FIG. 5

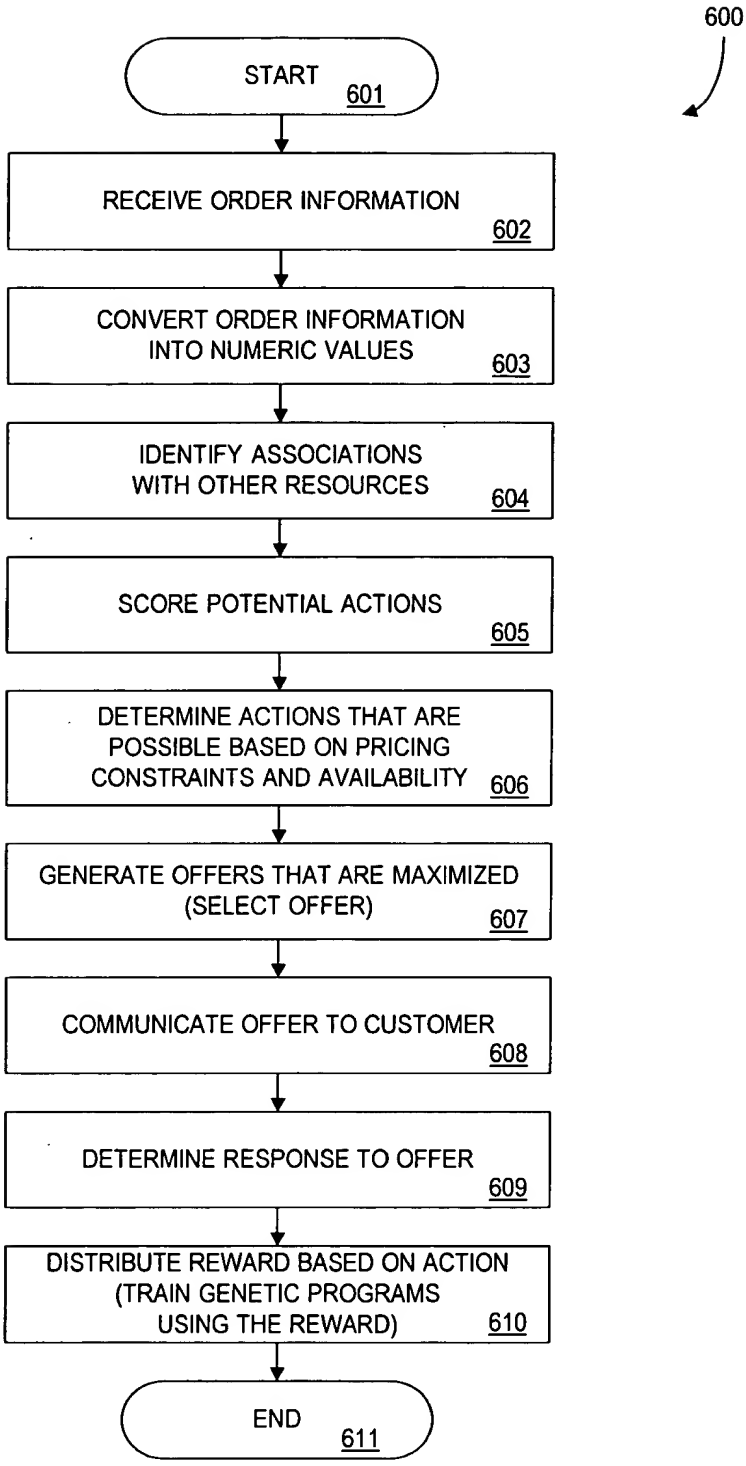
600
START
601
RECEIVE ORDER INFORMATION
602
CONVERT ORDER INFORMATION INTO NUMERIC VALUES
603
IDENTIFY ASSOCIATIONS WITH OTHER RESOURCES
604
SCORE POTENTIAL ACTIONS
605
DETERMINE ACTIONS THAT ARE POSSIBLE BASED ON PRICING CONSTRAINTS AND AVAILABILITY
606
GENERATE OFFERS THAT ARE MAXIMIZED (SELECT OFFER)
607
COMMUNICATE OFFER TO CUSTOMER
608
DETERMINE RESPONSE TO OFFER
609
DISTRIBUTE REWARD BASED ON ACTION (TRAIN GENETIC PROGRAMS USING THE REWARD)
610
END
611

FIG. 6

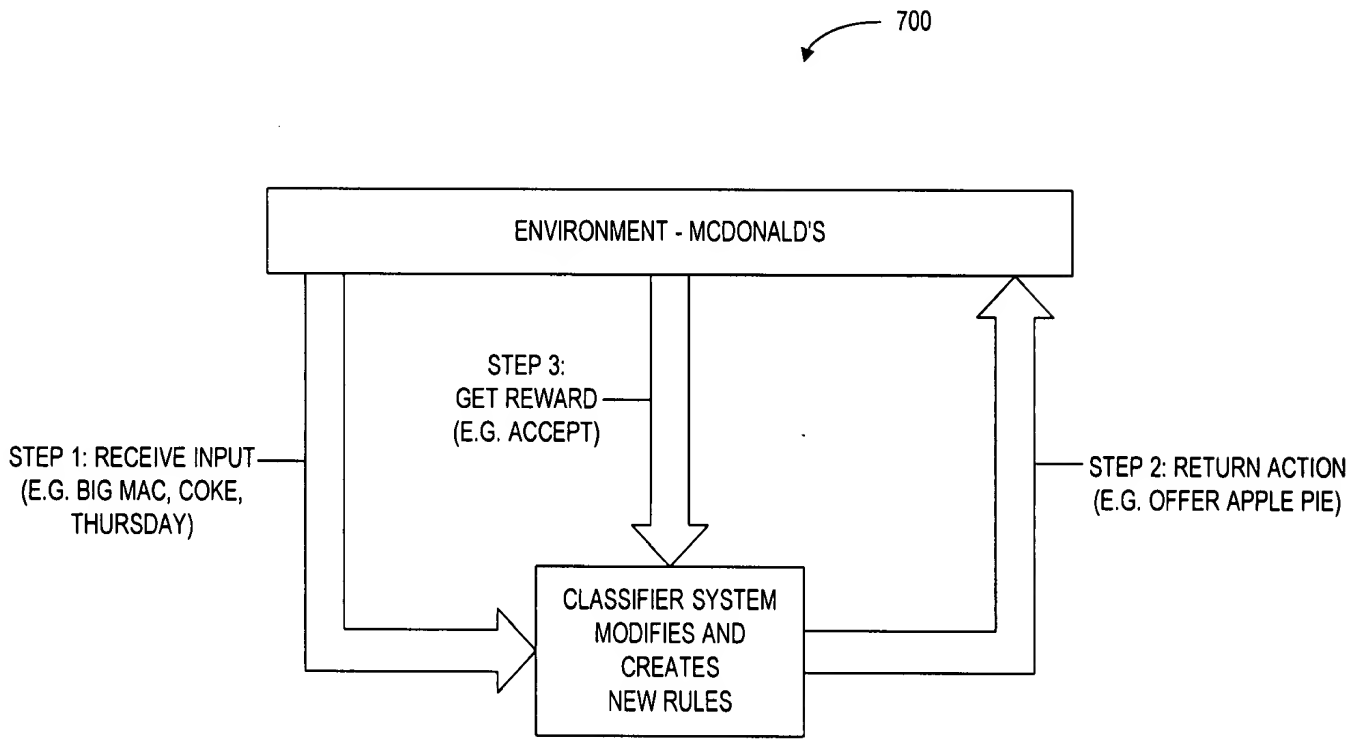
700
ENVIRONMENT - MCDONALD'S
STEP 3:
GET REWARD
(E.G. ACCEPT)
STEP 1: RECEIVE INPUT
(E.G. BIG MAC, COKE,
THURSDAY)
STEP 2: RETURN ACTION
(E.G. OFFER APPLE PIE)
CLASSIFIER SYSTEM
MODIFIES AND
CREATES
NEW RULES

FIG. 7

800

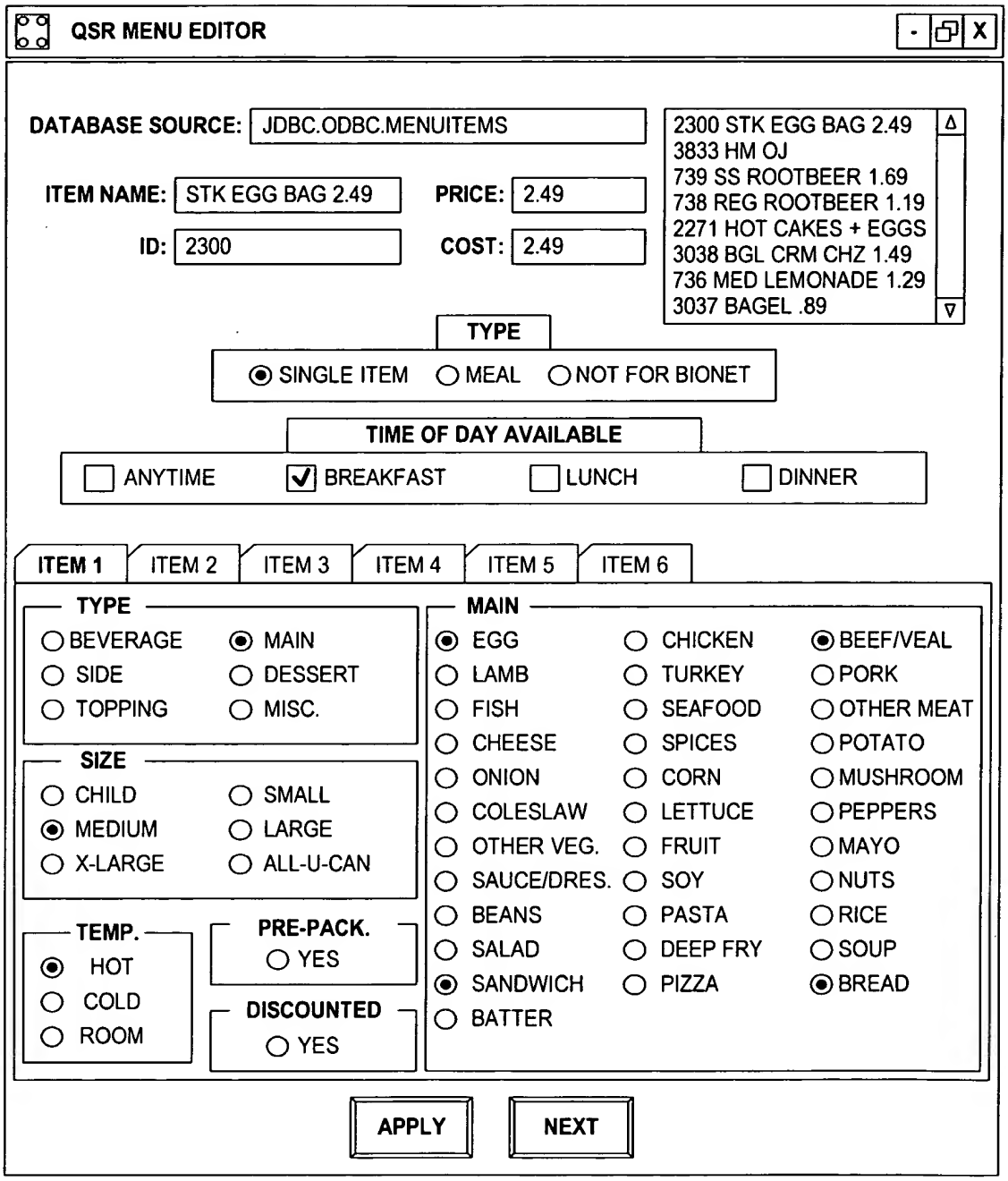
QSR MENU EDITOR
DATABASE SOURCE: JDBC.ODBC.MENUITEMS
2300 STK EGG BAG 2.49
3833 HM OJ
739 SS ROOTBEER 1.69
738 REG ROOTBEER 1.19
2271 HOT CAKES + EGGS
3038 BGL CRM CHZ 1.49
736 MED LEMONADE 1.29
3037 BAGEL .89
ITEM NAME: STK EGG BAG 2.49
PRICE: 2.49
ID: 2300
COST: 2.49
TYPE
SINGLE ITEM
MEAL
NOT FOR BIONET
TIME OF DAY AVAILABLE
ANYTIME
BREAKFAST
LUNCH
DINNER
ITEM 1
ITEM 2
ITEM 3
ITEM 4
ITEM 5
ITEM 6
TYPE
BEVERAGE
MAIN
SIDE
DESSERT
TOPPING
MISC.
SIZE
CHILD
SMALL
MEDIUM
LARGE
X-LARGE
ALL-U-CAN
TEMP.
HOT
COLD
ROOM
PRE-PACK.
YES
DISCOUNTED
YES
MAIN
EGG
CHICKEN
BEEF/VEAL
LAMB
TURKEY
PORK
FISH
SEAFOOD
OTHER MEAT
CHEESE
SPICES
POTATO
ONION
CORN
MUSHROOM
COLESLAW
LETTUCE
PEPPERS
OTHER VEG.
FRUIT
MAYO
SAUCE/DRES.
SOY
NUTS
BEANS
PASTA
RICE
SALAD
DEEP FRY
SOUP
SANDWICH
PIZZA
BREAD
BATTER
APPLY
NEXT

FIG. 8

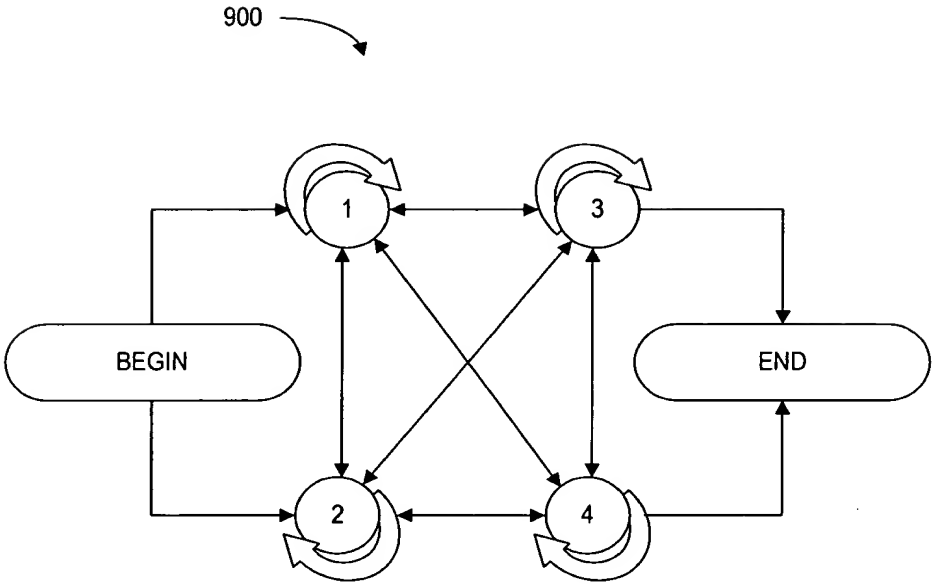

FIG. 9

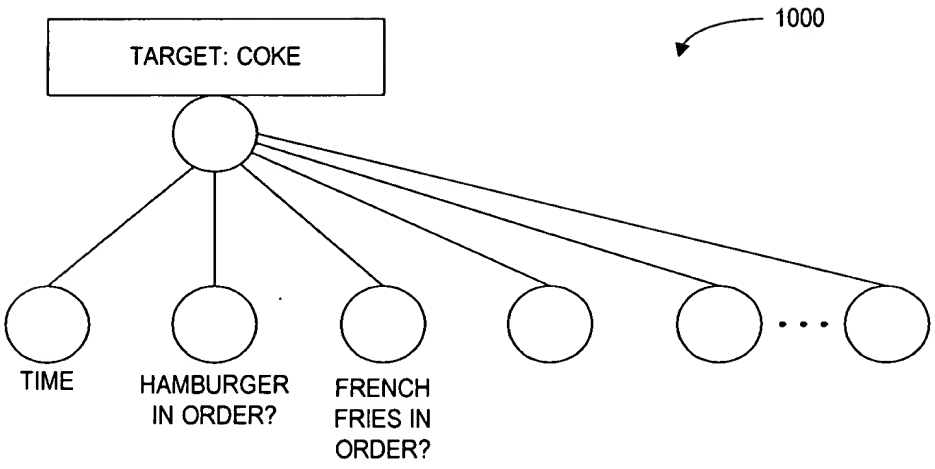
1000
TARGET: COKE
TIME
HAMBURGER IN ORDER?
FRENCH FRIES IN ORDER?

FIG. 10

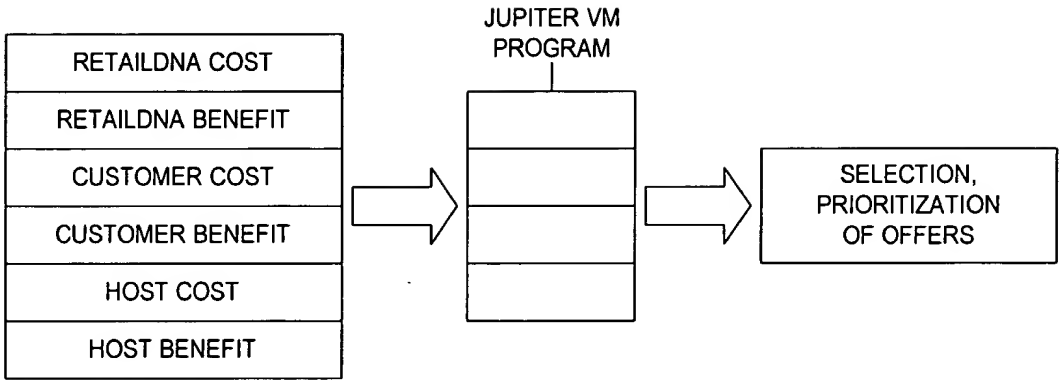
RETAILDNA COST
RETAILDNA BENEFIT
CUSTOMER COST
CUSTOMER BENEFIT
HOST COST
HOST BENEFIT
JUPITER VM PROGRAM
SELECTION, PRIORITIZATION OF OFFERS

FIG. 11

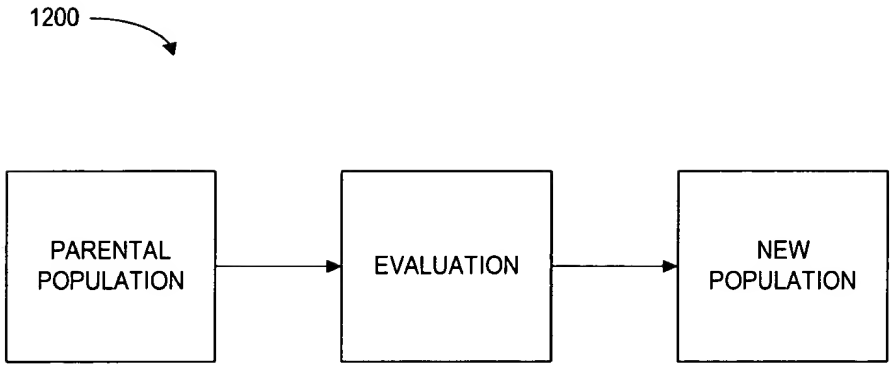

FIG. 12

Patent Pending

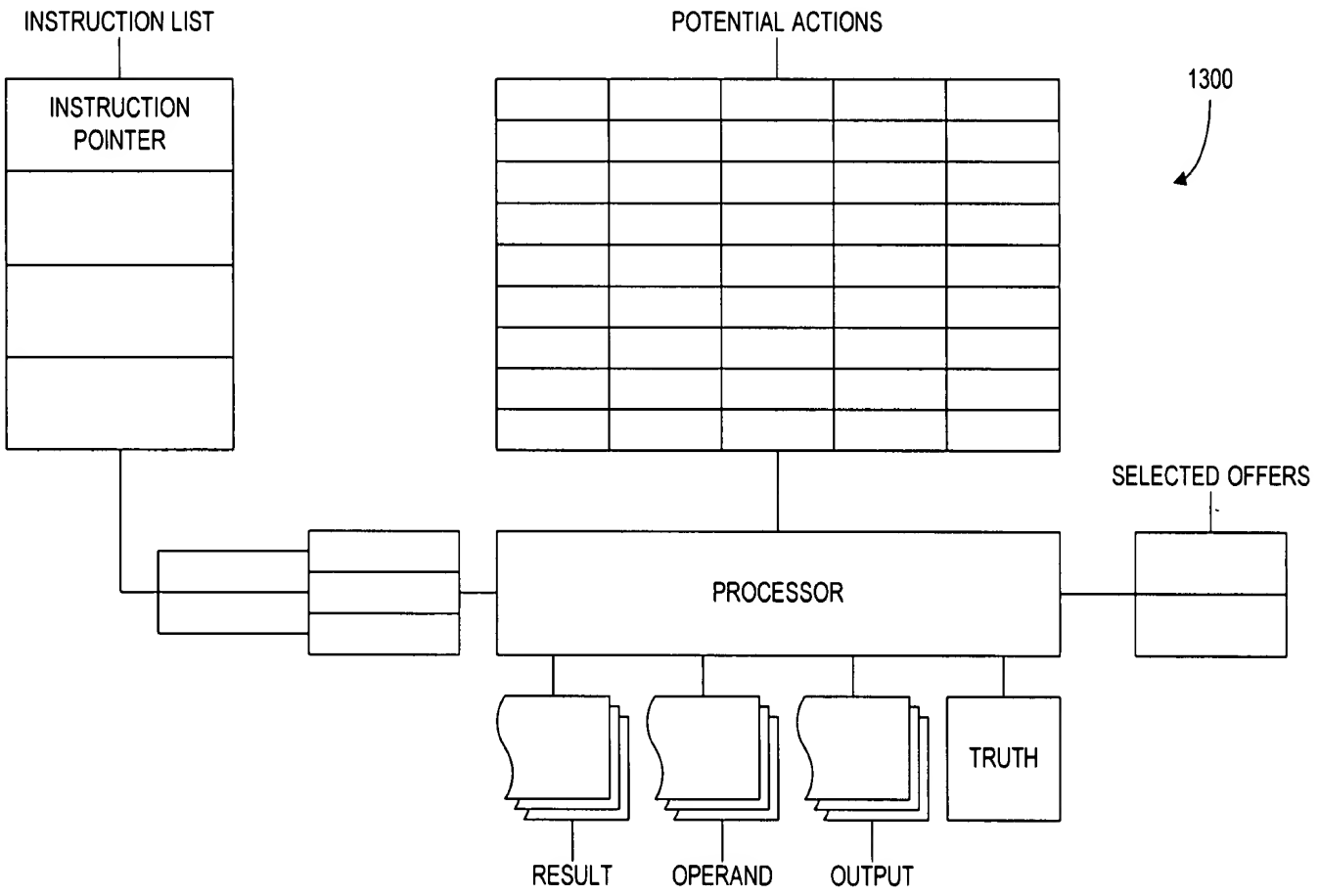

FIG. 13

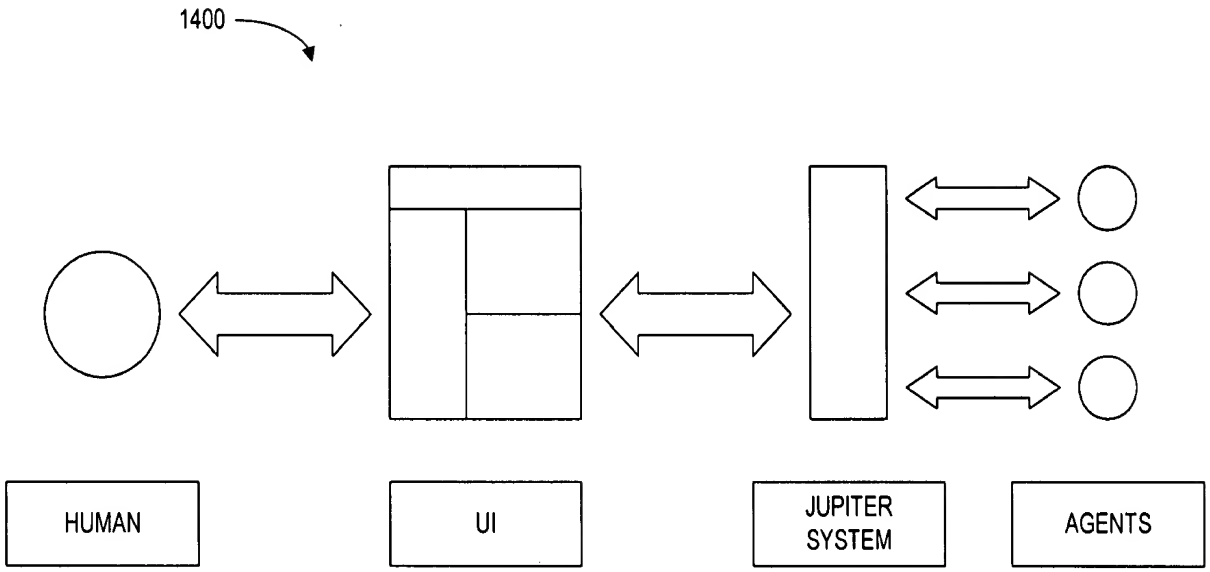

FIG. 14

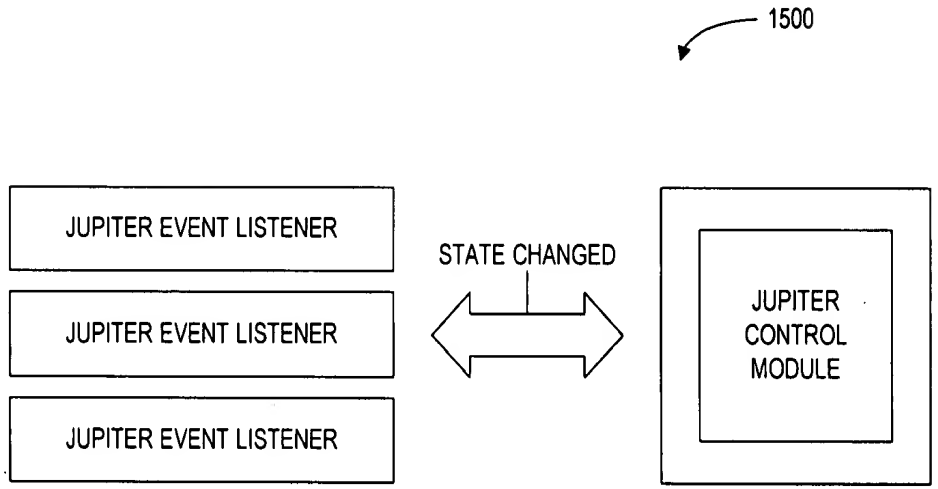
1500
JUPITER EVENT LISTENER
JUPITER EVENT LISTENER
JUPITER EVENT LISTENER
STATE CHANGED
JUPITER CONTROL MODULE

FIG. 15

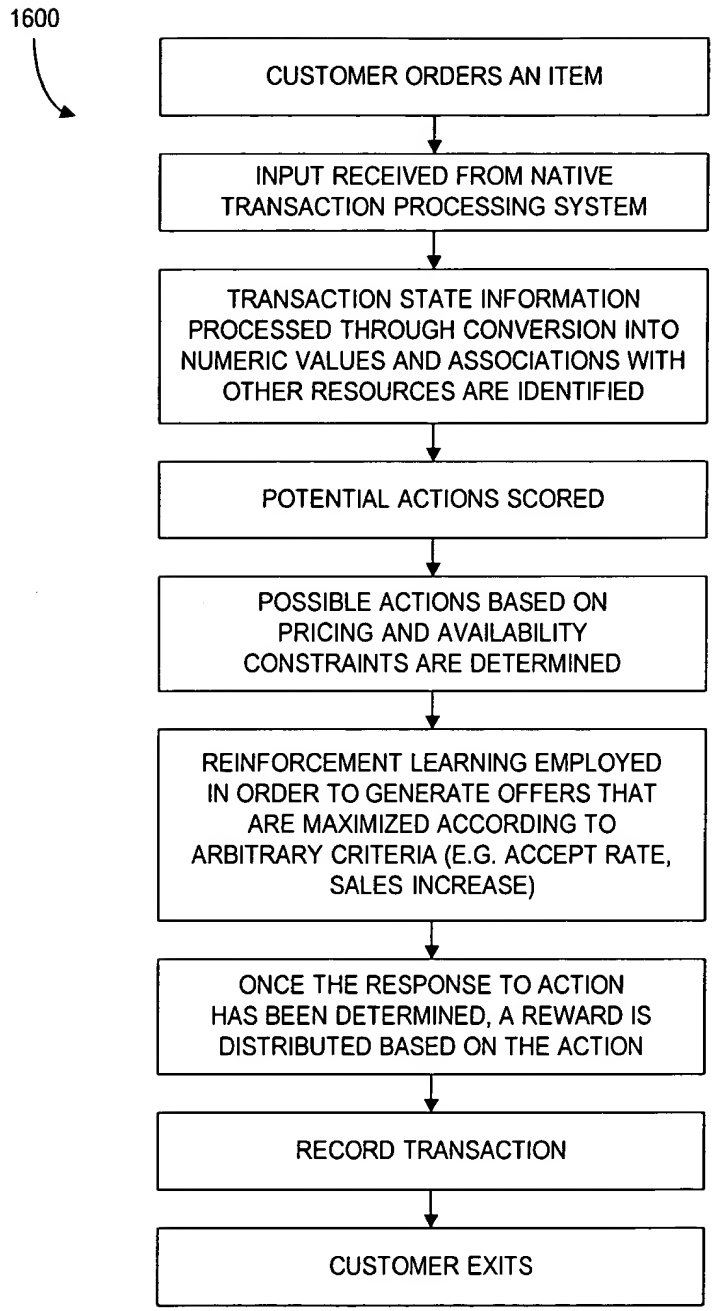
1600
CUSTOMER ORDERS AN ITEM
INPUT RECEIVED FROM NATIVE TRANSACTION PROCESSING SYSTEM
TRANSACTION STATE INFORMATION PROCESSED THROUGH CONVERSION INTO NUMERIC VALUES AND ASSOCIATIONS WITH OTHER RESOURCES ARE IDENTIFIED
POTENTIAL ACTIONS SCORED
POSSIBLE ACTIONS BASED ON PRICING AND AVAILABILITY CONSTRAINTS ARE DETERMINED
REINFORCEMENT LEARNING EMPLOYED IN ORDER TO GENERATE OFFERS THAT ARE MAXIMIZED ACCORDING TO ARBITRARY CRITERIA (E.G. ACCEPT RATE, SALES INCREASE)
ONCE THE RESPONSE TO ACTION HAS BEEN DETERMINED, A REWARD IS DISTRIBUTED BASED ON THE ACTION
RECORD TRANSACTION
CUSTOMER EXITS

FIG. 16

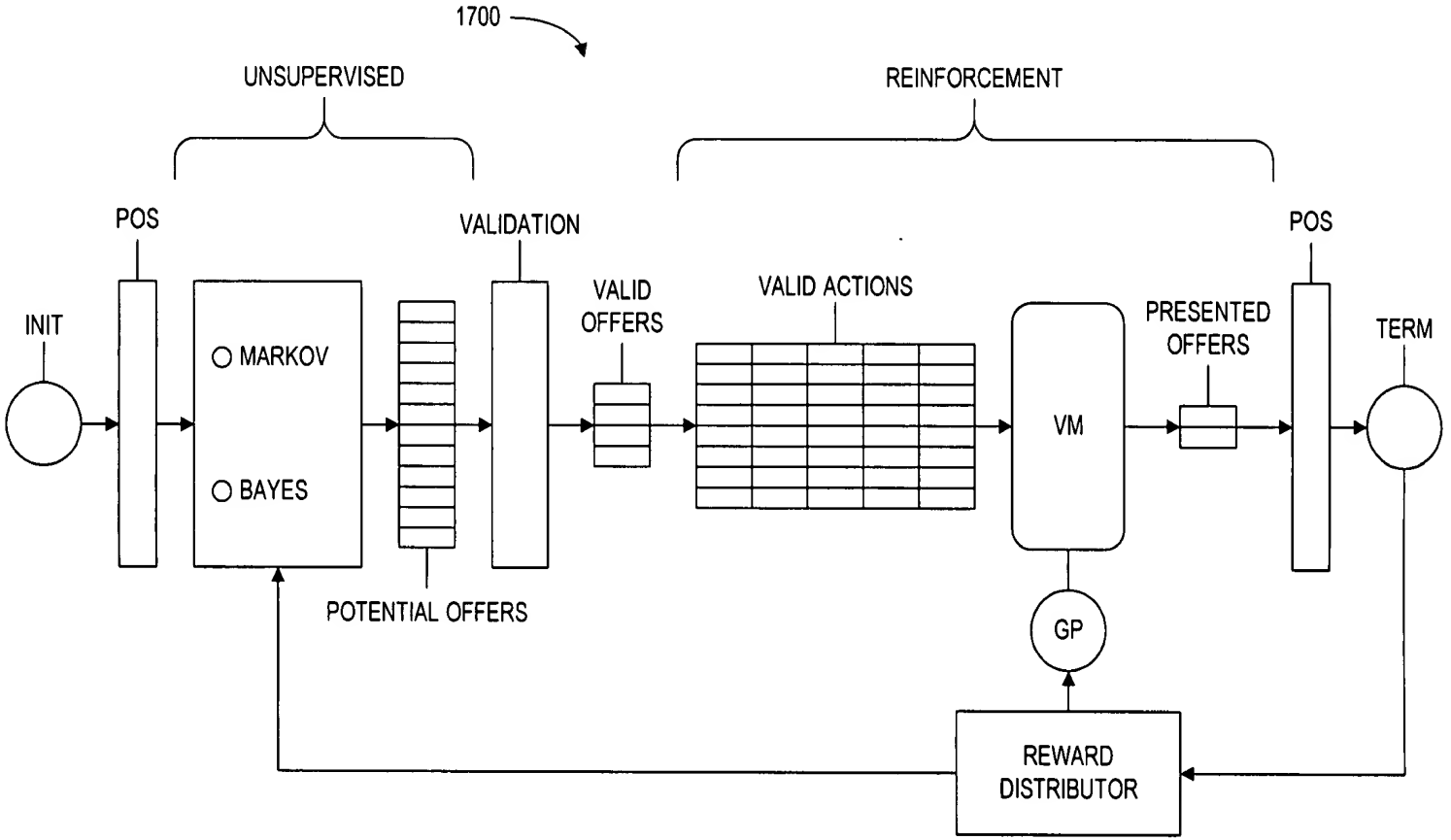
1700
UNSUPERVISED
REINFORCEMENT
POS
VALIDATION
POS
INIT
MARKOV
BAYES
VALID OFFERS
VALID ACTIONS
VM
PRESENTED OFFERS
TERM
POTENTIAL OFFERS
GP
REWARD DISTRIBUTOR

FIG. 17

1800

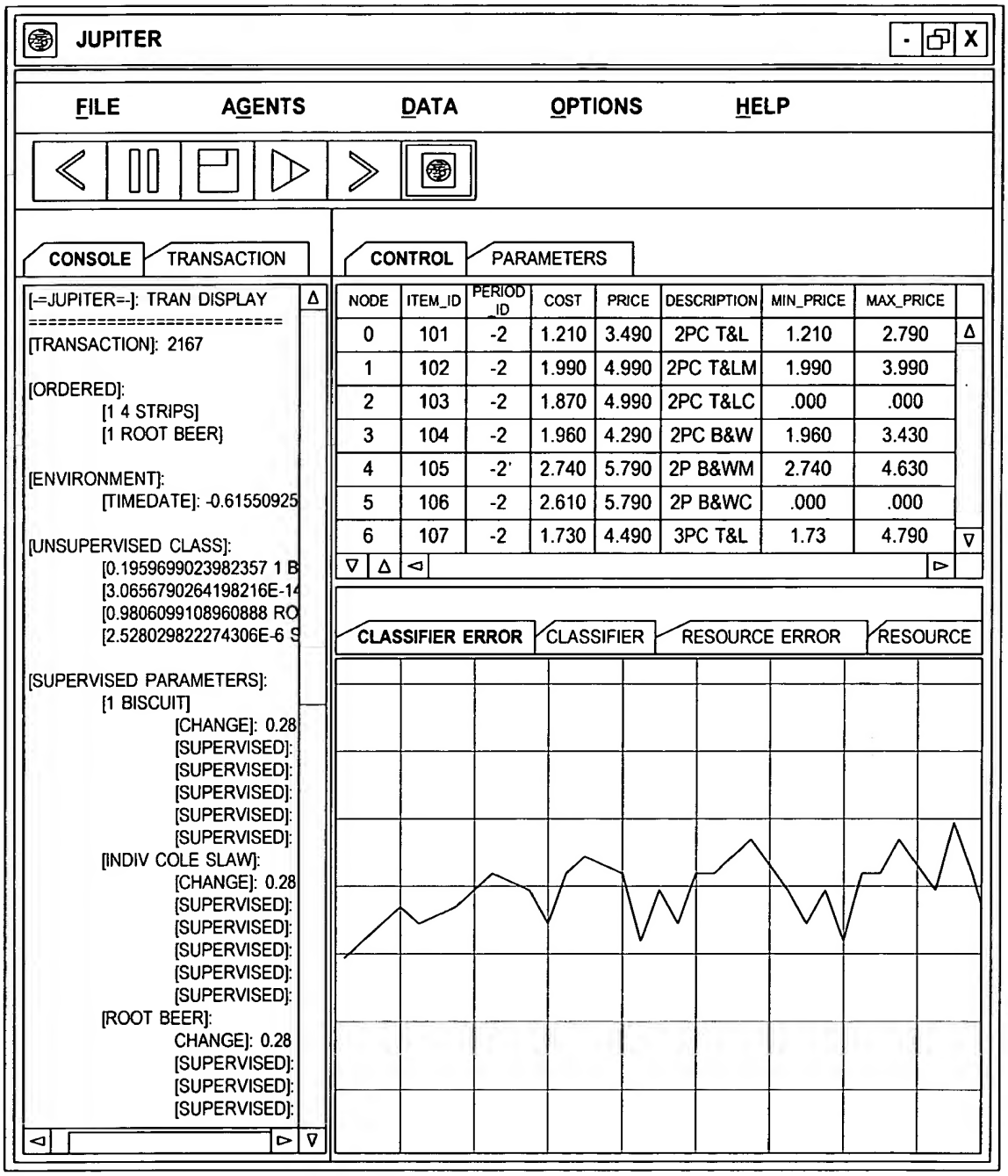
JUPITER
FILE
AGENTS
DATA
OPTIONS
HELP
CONSOLE
TRANSACTION
[=JUPITER=-]: TRAN DISPLAY
==========
[TRANSACTION]: 2167
[ORDERED]:
[1 4 STRIPS]
[1 ROOT BEER]
[ENVIRONMENT]:
[TIMEDATE]: -0.61550925
[UNSUPERVISED CLASS]:
[0.1959699023982357 1 B
[3.0656790264198216E-14
[0.9806099108960888 RO
[2.528029822274306E-6 S
[SUPERVISED PARAMETERS]:
[1 BISCUIT]
[CHANGE]: 0.28
[SUPERVISED]:
[SUPERVISED]:
[SUPERVISED]:
[SUPERVISED]:
[SUPERVISED]:
[INDIV COLE SLAW]:
[CHANGE]: 0.28
[SUPERVISED]:
[SUPERVISED]:
[SUPERVISED]:
[SUPERVISED]:
[SUPERVISED]:
[ROOT BEER]:
CHANGE]: 0.28
[SUPERVISED]:
[SUPERVISED]:
[SUPERVISED]:
CONTROL
PARAMETERS
NODE ITEM_ID PERIOD_ID COST PRICE DESCRIPTION MIN_PRICE MAX_PRICE
0 101 -2 1.210 3.490 2PC T&L 1.210 2.790
1 102 -2 1.990 4.990 2PC T&LM 1.990 3.990
2 103 -2 1.870 4.990 2PC T&LC .000 .000
3 104 -2 1.960 4.290 2PC B&W 1.960 3.430
4 105 -2' 2.740 5.790 2P B&WM 2.740 4.630
5 106 -2 2.610 5.790 2P B&WC .000 .000
6 107 -2 1.730 4.490 3PC T&L 1.73 4.790
CLASSIFIER ERROR
CLASSIFIER
RESOURCE ERROR
RESOURCE

FIG. 18

1900

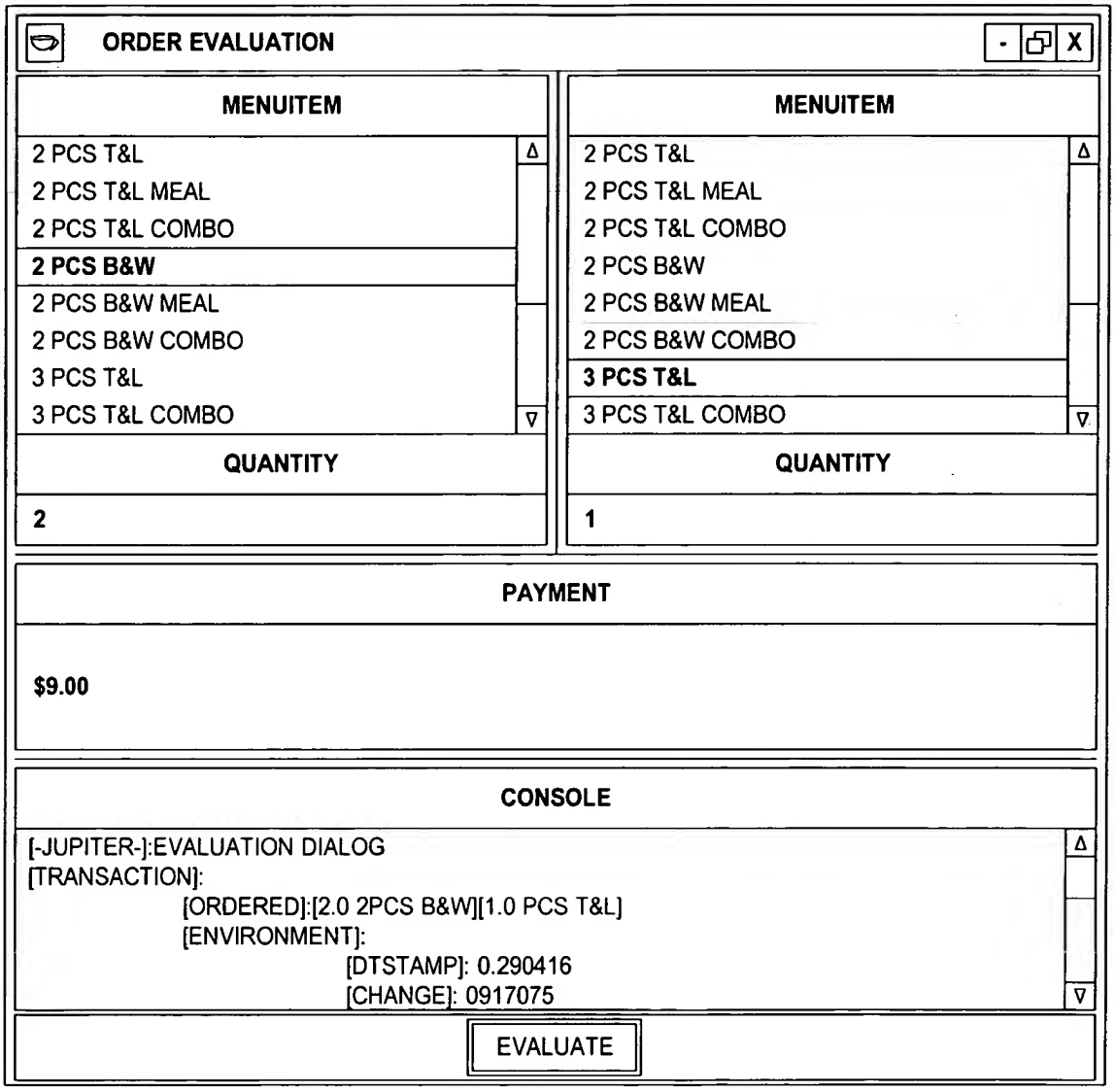
ORDER EVALUATION
MENUITEM
2 PCS T&L
2 PCS T&L MEAL
2 PCS T&L COMBO
2 PCS B&W
2 PCS B&W MEAL
2 PCS B&W COMBO
3 PCS T&L
3 PCS T&L COMBO
QUANTITY
2
MENUITEM
2 PCS T&L
2 PCS T&L MEAL
2 PCS T&L COMBO
2 PCS B&W
2 PCS B&W MEAL
2 PCS B&W COMBO
3 PCS T&L
3 PCS T&L COMBO
QUANTITY
1
PAYMENT
$9.00
CONSOLE
[-JUPITER-]:EVALUATION DIALOG
[TRANSACTION]:
[ORDERED]:[2.0 2PCS B&W][1.0 PCS T&L]
[ENVIRONMENT]:
[DTSTAMP]: 0.290416
[CHANGE]: 0917075
EVALUATE

FIG. 19

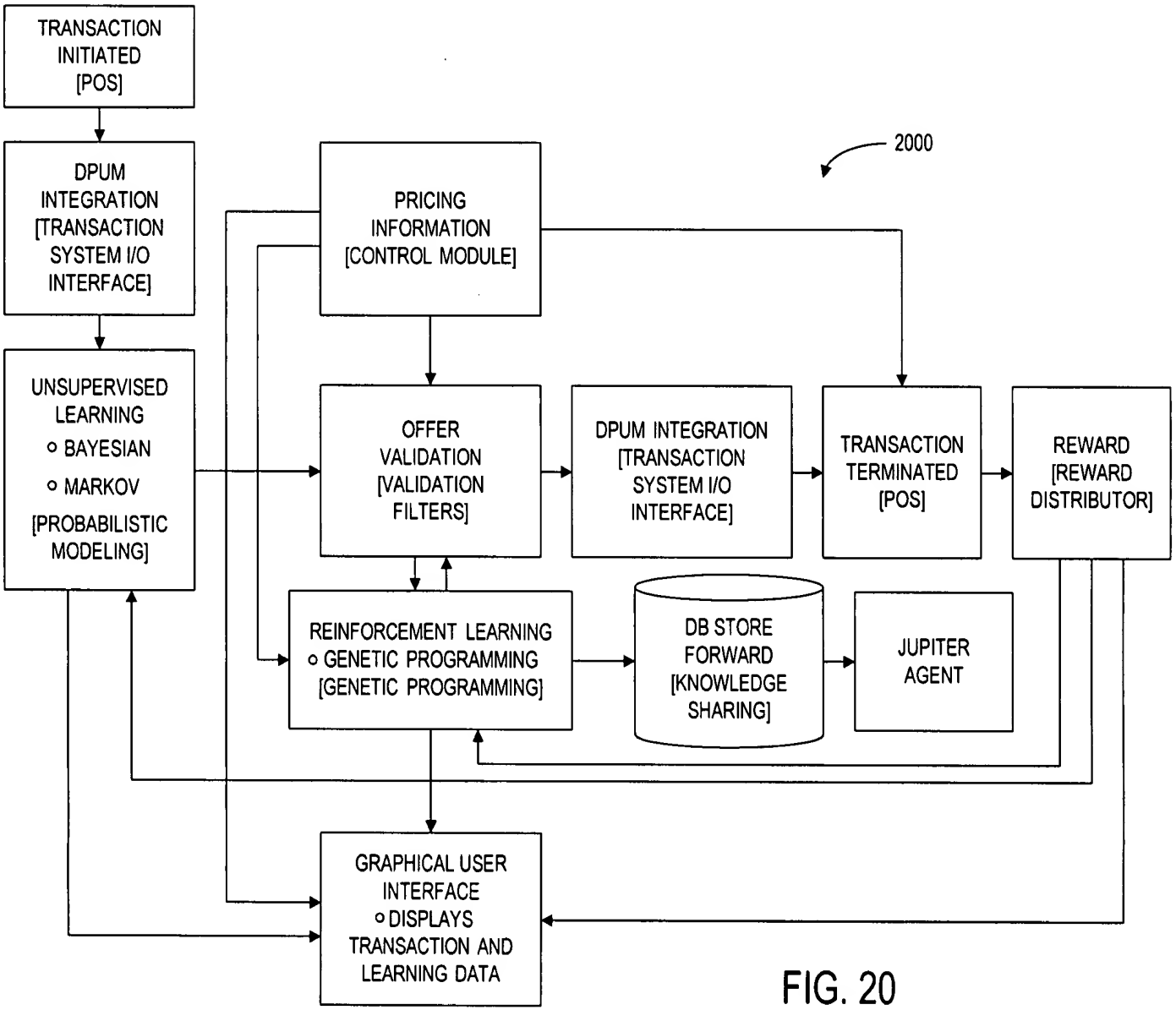
TRANSACTION INITIATED [POS]
DPUM INTEGRATION [TRANSACTION SYSTEM I/O INTERFACE]
UNSUPERVISED LEARNING
o BAYESIAN
o MARKOV
[PROBABILISTIC MODELING]
PRICING INFORMATION [CONTROL MODULE]
2000
OFFER VALIDATION [VALIDATION FILTERS]
DPUM INTEGRATION [TRANSACTION SYSTEM I/O INTERFACE]
TRANSACTION TERMINATED [POS]
REWARD [REWARD DISTRIBUTOR]
REINFORCEMENT LEARNING
o GENETIC PROGRAMMING
[GENETIC PROGRAMMING]
DB STORE FORWARD [KNOWLEDGE SHARING]
JUPITER AGENT
GRAPHICAL USER INTERFACE
o DISPLAYS TRANSACTION AND LEARNING DATA

FIG. 20